AN. INST. BIOL. UNIV. NAL. AUTÓN. MÉXICO 50, SER. ZOOLOGÍA (1): 19-23 (1979)

PROPOSED SYNONYMY OF *CLADOLECITHOTREMA* ICHIHARA, 1970 WITH *TRIFOLIOVARIUM* YAMAGUTI, 1940 (HEMIURIDAE-TREMATODA)

A. N. GUPTA*

ABSTRACT

A new digenetic trematode, *Cladolecithotrema callionym* Ichihara, 1970, was obtained from the rectum of marine fishes from Japanese waters. The author concluded these forms to be distinct from the genus *Trifoliovarium* Yamaguti, 1940 obtained also from marine fish from Japanese waters. However, he regards his genus to be quite close to *Trifoliovarium*. The present author, however, feels that the creation of a new genus on such variable characters, challengable by modern information of principles of genetics is only making confusion worse confounded in the field of taxonomy of digenetic trematodes.

RESUMEN

Un nuevo tremátodo digéneo, *Cladolecithotrema callionym* Ichihara, 1970, se obtuvo del recto de peces marinos de aguas japonesas.
El autor concluye que estas formas deben ser distintas del género *Trifoliovarium* Yamaguti, 1940, obtenido igualmente de peces marinos de aguas japonesas.
Sin embargo, considera a este género cercanamente relacionado a *Trifoliovarium*. No obstante, el autor del presente trabajo considera que la creación de un nuevo género basado en caracteres tan variables, es rebatible por las informaciones modernas de los principios genéticos, que solamente crean confusión, en el campo de la taxonomía de los tremátodos digéneos.

INTRODUCTION

Forms of *Trifoliovarium* Yamaguti, 1940 were obtained from the marine fish *Acanthocephala limbata* from Maïsaka, Japan. Faust, 1929, introduced the concept of the superfamily Hemiuroidea with Hemiuridae Lühe, 1901 as one of the families included under it; Lecithasterinae Odhner, 1905 one of its sub-families including *Trifoliovarium* Yamaguti, 1940 along with a few other genera. Yamaguti, not in agreement with such a taxon, created a new sub-family, Trifoliovarinae in 1958, with *Trifoliovarium* as the only genus under it and assigned it under the family Hemiuridae Lühe, 1901. Skrjabin and Gushanskaya, in 1960, proposed the concept of the suborder Hemiurata (Markevich, 1951), Skrjabin and Gushanskaya, 1954; the family Lecithasteridae Skrjabin and Gushanskaya 1955 was included under the super-family Hemiuroidea Faust, 1929 emend. Skrjabin and Gushanskaya, 1955.

* Department of Zoology, University of Udaipur, *UDAIPUR* - 313001 INDIA.

The genus *Trifoliovarium* was kept as one of the genera under the sub-family Lecithasterinae Odhner, 1905.

This shows that the assignment of this genus, *Trifoliovarium*, under distinct subfamilies and families by different authors does have some conflicting features - morphological, anatomical and phylogenetic which are responsible, perhaps, for not allowing to have an agreed classification. The addition of one more new genus on some such shaky characters has further added dimensions to this confused state because such characters do not conform to generic evaluation criteria, hence this work proposes the suppression of this new genus.

DISCUSSION

The characteristic feature of the genus *Trifoliovarium* is, besides others, the trilobate nature of its ovary and long slender body according to Yamaguti, 1958, who in 1970 amended the generic and sub-family diagnosis; the major amendment introduced was the four-lobed nature of the ovary instead of a trilobate condition. Ichihara recovered few forms of digenea from the rectum of three different marine fishes viz., *Callionymus lunatus* Temmnik and Schlugel; *Callionymus flagris* Jordan and Flower and *Calliurichthys japanicus* (Honttuyn), and created another genus *Cladolecithotrema* Ichihara, 1970 with *C. callionym* as its type species. The type species was obtained from *Callionymus lunatus* - the type host, without making any reference to forms obtained from the other two hosts. He based observations on the study of twenty-four forms, mentioning resemblances between *Cladolecithotrema* and *Trifoliovarium* without spelling specific points of resemblances yet differentiates these genera on the basis of body shape, entirely pre-acetabular seminal vesicle, lobed vitellaria being branched, and the absence of Laurer's canal. Except for the form of the body these characters are also found in other genera of the family Hemiuridae. The criteria for speciation of helminths, based on gross morphology, which are more prone to vary (thanks to recent knowledge of genetics) recently is under severe criticism.

If the body form were the only criteria, the assignment of this subfamily Trifoliovarinae under the Hemiuridae would be unjustifiable, as Yamaguti himself mentions under the family diagnosis that "small to medium sized distomes", similarly so the placement of the genus *Trifoliovarium* should have been according to Skrjabin and Gushanskaya, 1954. There are scores of examples where body form has not been given such a higher status in the systematics of digeneans. Based on such an argument the assignment of *Cladolecithotrema* should also not have been made under the sub-family Trifolivarinae by Yamaguti in 1958, when in the subfamily and generic diagnosis it is clearly mentioned that the body is "long and slender", though in Ichihara's form the body is cylindrical and not slender. In that case the placement of the genus *Cladolecithotrema* appears more justifiable under the sub-family Lecithasterinae rather than under the Trifolivarinae. *Cladolecithotrema* otherwise in shape resembles *Lecithaster* Lühe, 1901 (Lecithasterinae Odhner, 1905) and *Hysterolecitha* Linton, 1910 (Lecithasterinae Odhner, 1905) of the Russian author's concept who as-

signed it under the family Lecithasteridae Skrjabin and Gushanskaya, 1954. But *Cladolecithotrema* differs from these in one important character, which has more bearing and relevant taxonomic value than the other characters, for example the extension of the uterine coils, posterior to the ovary.

Yamaguti, 1971 assigns *Cladolecithotrema* under the family Isoparorchiidae, though Ichihara in is acknowledgement thanks Yamaguti for his advice in determining the systematics of this genus. Ichihara, in the discussion part of this new genus, had hinted resemblences of his genus with *Elongoparorchis* Rao, 1961. But by no stretch of imagination it appears possible to the present author to conceive of the placement of *Cladolecithotrema* under the family Isoparorchiidae Poche, 1926. The family Isoparorchiidae is differentiated by the flat foliate body, the tubular ovary lying behind the testes and the arboraceously ramifying vitellaria lying in the median part of the body. In that condition, the placement of *Trifoliovarium* appears more meaningful if kept under the family Lecithasteridae, which differes from other families of the suborder Hemiurata in the presence of single stellate vitellaria consisting of long lobes or seven large close-set follicles. The present author, however, does not agree with the taxon put forth by Yamaguti, 1971 and differs on the following grounds:

A form is determined by the interaction of two variables (Protoplams DNA) and the environment, the latter differing very much. In case of a digenetic trematode it is an interaction at three levels. A specimen of *Trifoliovarium* is reported to have been recovered from the intestine; *Cladolecithotrema* from the rectum, while *Isoparorchis* from the swim bladder. Environment, the known factor, has played a dominant role in determining the shape of the parasite but of what value - so far as this taxon is concerned in systematics. This has to be considered in a different perspective of all other organ systems as well. Under the present conditions, when criteria for the speciation of helminths based on such shaky, gross morphology which are more prone to vary is under so severe but genuine criticism, resorting to characters like body form for creating a new genus sounds unconvincing. Reservations are made that despite such marked differences in body form, this character alone, the author is afraid of, cannot be resorted to in distinguishing the genera because several instances are available where erroneous conclusions could have been drawn on account of such criteria. It is a proven fact that trematodes become mature even when they are one fourth of the normal size. Senger (1954) reported that *Echinostoma revolutum* starts laying eggs after six days of its infection though the maximum length is not attained until after twenty eight days in the chick. There is also variation in the time taken by different individuals within the same population to reach the various stages in development discribed above. Senger (1954) infected rats and chicks with *Echinostoma revolutum* and observed that the maximum size of parasites from the rat was 2.6 mm whereas the parasite of the same age from the chick reached 1 mm in size. Further, the various parts of a digenean do not grow at the same rate. In the Strigeoid species development into the mature adult is characterized by a tremendous increase in the size of the hind body which contains the reproductive system as compared to that of the fore body. Dawes in 1962, reports in *Fasciola hepatica* when found in mice, that the greatest increment in size is added to

length rather than to breadth, the ventral sucker increased in size to a greater extent than the oral sucker and that the major increase occurred in the body posterior to the ventral sucker. Berrie (1960) found that in adult *Diplostomum phoxini* the relative proportion of fore body to hind body differed between various hosts. Host-induced variations may be a complicating factor specially if the intensity of infection is abnormally high or if the host is not a normal one.

Wolfgang, 1955 found great variations in the oral spine of *Stephanostomum baccatum* Nicoll, 1912 though based his conclusion on 400 specimens from a single host — a case of over population. Most species of this genus occur from 1-5 specimens in a host, and in these cases the oral spination seems rather constant. Experimental study of variations induced by living in unnatural hosts has been made in only a few cases. Watertot (1967) reports that *Telorchis bonnerensis* Waits, 1960 a parasite of salamanders showed variations in body size, extent of vitellaria and in egg size in certain species of salamanders and turtles, Grabda - Kazubska (1967) found that in *Opisthoglyphe ranae* (Frolich, 1971) great variations exist according to the species of its final host. The resultant variations were with shorter and underbodies, testes of different shape and of different vitellaria though hosts were *Rana temporaria, R. esculenta* and *R. terrestris.* The most appropriate host was *R. esculenta;* if induced to live in *Natrix natrix* it showed still other variations.

Looking to the genera *Trifoliovarium* and *Cladolecithotrema* clothed with their characterization it could be concludingly summed up as below; the specific and distinguishing characters of the genus *Trifoliovarium* being the following:

1. Seminal vesicle being in hind body.
2. Vitellaria posterior to testes.
3. Vitellaria divided into two compact masses, lobed or not.
4. Ovary and vitellaria not separated from posterior extremity by uterus.

The distinctness of *Cladolecithotrema* from *Trifoliovarium* was based on the differences in body shape, entirely pre-acetabular position of seminal vesicle, lobed vitellaria being branched and absence of Laurer's canal.

To the author, the two characters for example, the branched nature of the lobes of vitelline gland and absence of Laurer's canal appear to be characters only of specific value while the other two are variables depending on many factors, such as fixation, preparation, age of the host and the parasite, and the physio-chemical state of the parasite. Their physiological and ecological interrelations can also lead to variations in its body shape as well as the positions whether being posterior, postero-dorsal or post-acetabular so far seminal vesicle is concerned. The other two characters being specific ones may give the Ichihara form a new species status only.

REFERENCE

BERRIE, A. D. 1960. The influence of various definitives hosts on the development of *Diplostomum phoxini* (Strigeida: Trematoda) *J. Helminth 34*: 205-10.

BILQEES, F. M., 1973. Marine fish trematodes of Pakistan. XIII. Three new species (Allocreadiidae and Hemiuridae), including a new genus *Karachitrema* gen. n. *Acta Parasit. Polonica 21*, fasc. 23: 327-334.

DAWES, B., 1962. On the growth and maturation of *Fasciola hepatica* L. in the mouse. *J. Helminth 36*, 11-38.

GRABDA-KAZUBSKA, B., 1967. Morphological variability of adult *Opisthioglyphe ranae* (Frolich, 1791) Trematoda Plagiorchiidae) *Acta Parasitol. Polon. 15*: 15-34.

ICHIHARA, A., 1970. "A new digenetic trematode *Cladolecithotrema callionymi* n.g., n. sp. (Hemiuridae) of marine fishes from Sagami Bay. *Res. Bull. Meguro Parasit. Mus. 4*: 11-14.

MACCAULEY, J. E., 1960: Some hemiurid trematodes of Oregon marine fishes. *Jour. Parasitol. 46* (1): 84-89.

MANTER, H. W. & M. H. PRITCHARD, 1960. Additional Hemiurid trematodes from Hawain fishes. *Proc. Helm. Soc. Wash., 27*: 165-180.

NAGATY, H. F. and T. M. ABADAL, 1962. Trematodes of fishes from Red Sea part 13. On three new Hemiurid species *J. Arab. Vet. Med. Asst. 22*: 228-230.

SENGER, C. M., 1954. Notes on growth development and survival of two echinostome trematodes. *Expl. Parasit 3*: 491-6.

SKRJABIN, K. I. & L. K. GUSHANSKAJA, 1956. Classification of the Sub-order Hemiurata (Markevich, 1951) Skrjabin et. Gushanskaja (1954). *Trud. Gelmit. Lab. Akad. Nauk. S.S.R. 8:* 144-158.

—— et al, 1954. *Keys to the trematodes of animals and man.* Univ. Illinois Press. Urbana. Translated by R. W. Dooly.

WATERTOT, J. L., 1967. Intra specific variations of adult *Telorchis bonnerensis* (Trematoda: Telorchiidae) in amphibian and reptilian hosts. *J. Parasitol. 53*: 962-968.

WOLFGANG, R. W., 1955. Studies of the trematode *Stephanostomun baccatum* (Nicoll, 1907). IV. the variations of the adult morphology and the taxonomy of the genus. *Can. J. Zool. 33*: 129-142.

YAMAGUTI, S., 1940. "Studies on the helminth of fauna of Japan, Part 31. Trematodes of fishes, VII". *Japan J. Zool. 9* (1): 87-89.

——, 1958. *Systema Helminthum Vol. I. The digenetic trematodes of vertebrates, Part I and II.* Inter Science Publ. N. Y. 1575 pp.

——, 1971. *Synopsis of digenetic trematodes of vertebrates.* Keigaku Publ. Co., Tokyo, 1800 pp.